

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED

Ex parte FANNY BARBOTIN, CHRISTOPHE BOISSON
and ROGER SPITZ

APR 27 2005

U.S. PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Appeal No. 2005-0728
Application No. 09/688,376

HEARD: April 7, 2005

Before OWENS, KRATZ, and JEFFREY T. SMITH, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from a rejection of claims 1-20 and 24.

Claims 21-23 have been canceled.

THE INVENTION

The appellants claim a solid supported catalyst for polymerizing conjugated dienes, and claim a process for making the catalyst. Claim 1, which claims the catalyst, is illustrative:

1. A solid supported catalyst for the polymerization of conjugated dienes, comprising a reaction product of
 - a. a complex represented by formula $M(Ar)(AlX_4)_3$, where M is selected from the group consisting of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium,

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ytterbium, and lutetium, Ar is an aromatic hydrocarbon solvent, Al is aluminum and X is selected from the group consisting of fluorine, chlorine, bromine and iodine, and

b. a solid support comprising an inorganic metal oxide compound.

THE REFERENCES

Jones et al. (Jones) WO 92/17510 Oct. 15, 1992
(PCT application)

Jing-yu Hu et al. (Hu), "Study on the Polymerization of Isoprene Catalyzed by Neutral Arene Organolanthanoids-AlR₃ System", 37 *Chinese Sci. Bull.* 566-70 (Apr. 1992).

THE REJECTION

Claims 1-20 and 24 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hu in view of Jones.

OPINION

We reverse the aforementioned rejection.

Each of the appellants' independent claims requires a reaction product of a complex and a solid support comprising an inorganic metal oxide compound. The complex is represented by the formula M(Ar)(AlX₄)₃, where M is selected from a list of rare earth metals, one of which is Nd, Ar is an aromatic hydrocarbon solvent, Al is aluminum, and X is fluorine, chlorine, bromine or iodine.

Hu discloses a catalyst solution for the *cis*-1,4 stereospecific polymerization of isoprene (page 566). The

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catalyst solution is made by mixing $\text{NdC}_6\text{H}_6(\text{AlCl}_4)_3$, a solvent and AlR_3 , where R is alkyl (page 566; tables 1 and 2).

Jones discloses, as olefin polymerization catalysts which provide largely isotactic polymers, pi-arene complexes of lanthanide metals on solid supports which can be alumina or silica (abstract). The lanthanide metals can be the appellants' neodymium, samarium, gadolinium, erbium and ytterbium (page 3, lines 23-30). Jones believes that the catalyst is a 2:1 (molecular) arene: lanthanide pi-complex in the form of an arene:lanthanide:arene sandwich compound (page 3, lines 9-22), and that when the complex reacts with a solid support's surface hydroxylation, one molecule of arene is lost and the lanthanide metal becomes linked to the solid by an oxygen atom (page 5, lines 3-12). Jones teaches that "the supported catalysts are not as reactive as the pi-complexes themselves" (page 6, lines 34-35).

The examiner argues that "[i]t would have been obvious to one of ordinary skill in the art to apply the teaching of Jones to the disclosure of Hu with a reasonable expectation of obtaining a highly-useful catalyst and method of making it with the expected benefit of being able to use the catalyst in gas phase and slurry phase polymerizations, these two techniques

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being among the most often commercially used olefin polymerization techniques" (answer, page 4), and that "it is quite conventional to place olefin polymerization catalysts on supports, for example alumina or silica, two of the most prevalent support materials used in olefin polymerization catalysts and both reading on Appellant's support materials, so that the catalysts may be used in slurry phase or gas phase polymerization processes, for example in the Union Carbide UNIPOL™ process, one of the most prevalent olefin polymerization processes in use today" (answer, page 5).

To establish a *prima facie* case of obviousness the examiner must show that the applied references themselves would have provided one of ordinary skill in the art with both a motivation to carry out the appellants' claimed invention and a reasonable expectation of success in doing so. See *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894, 902, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988). A motivation for one of ordinary skill in the art to place Hu's catalyst on Jones' support, as argued by the examiner, would have been to perform slurry or gas phase polymerization.

The examiner, however, has not provided evidence or technical reasoning which shows that if Hu's complex were reacted

with Jones' support, one of ordinary skill in the art would have had a reasonable expectation of success in obtaining the product desired by Hu, i.e., *cis*-1,4 stereospecific polyisoprene. As argued by the appellants (brief, page 7), in Jones' 2:1 pi-complexes the lanthanide metal atom is formally in the 0 valence state (page 3, lines 11-13), whereas Hu's Nd has a valence of +3. The examiner points out that Jones' oxidation states are merely formal and do not necessarily correspond to the actual electronic configuration of the metal atom (answer, page 7). To establish a *prima facie* case of unpatentability, however, the examiner must do more than merely point out that Jones' oxidation states are formal rather than actual. The examiner must provide evidence or technical reasoning which shows that, regardless of the difference of 3 between the formal oxidation states of Jones and Hu, one of ordinary skill in the art would have had a reasonable expectation of obtaining Hu's desired *cis*-1,4 stereospecific polyisoprene when Hu's catalytic complex has been reacted with Jones' support. Because the examiner has not done so, the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the appellants' claimed invention.

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DECISION

The rejection of claims 1-20 and 24 under 35 U.S.C. § 103
over Hu in view of Jones is reversed.

REVERSED

<i>Terry J. Owens</i>)
Terry J. Owens)
Administrative Patent Judge)
)
<i>Peter F. Kratz</i>)
Peter F. Kratz)
Administrative Patent Judge)
)
<i>Jeffrey T. Smith</i>)
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